UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/549,673	12/01/2005	Morten Syslak	2005-1455A	8459

513 7590 10/21/2009

WENDEROTH, LIND & PONACK, L.L.P.
1030 15th Street, N.W.,
Suite 400 East
Washington, DC 20005-1503

EXAMINER	
SHEVIN, MARK L	

ART UNIT	PAPER NUMBER
1793	

MAIL DATE	DELIVERY MODE
10/21/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/549,673
Filing Date: December 01, 2005
Appellant(s): SYSLAK ET AL.

Michael R. Davis
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed August 10th, 2009 appealing from the Office action mailed January 13th, 2009.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

The following is a listing of the evidence (e.g., patents, publications, Official Notice, and admitted prior art) relied upon in the rejection of claims under appeal:

6,238,497	JIN	May 29, 2001

6,261,706	FUKUDA	July 17, 2001
6,531,006	JIN	March 11, 2003
3,827,917	ZIEGLER	August 6, 1974

"Heat Treating of Aluminum Alloys: Annealing", in *ASM Handbook* (revised Vol. 4) Metals Handbook (1998), p. 4, para 1.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

(9-A) **<u>Claims 1-2, 6, and 20</u>** are rejected under 35 U.S.C. 103(a) as being unpatentable over **US '497** (US 6,238,497 B1) in view of **Fukuda** (US 6,261,706).

<u>US '497</u>

US '497 is drawn to a method of producing an aluminum alloy fin stock material for use in heat exchangers (Abstract and Col. 2, lines 25-30).

US '497 teaches that iron in the aluminum alloy forms intermetallic particles during casting that are relatively small and contribute to particle strengthening but when these particles are instead present as large particles, it is difficult to roll such a material to very thin fin stock gauges (col. 3, lines 19-30).

An aluminum alloy is first continuous strip cast at a predetermined cooling rate to form a strip with a thickness of from 3 to 30 mm (col. 4, lines 16-25).

The cast strip is then rolled to an intermediate gauge by cold rolling and then annealed (col. 3, lines 30-32). The intermediate gauge strip is then cold rolled to final gauge (col. 3, lines 32-34).

US ‘497 specifically links the average cooling rate with the size of intermetallic particles produced (col. 4, lines 50-65), but do not teach what constitutes large particles.

Fukuda

Fukuda teaches an aluminum alloy clad material for heat exchangers that exhibits superior strength after brazing and excellent corrosion resistance (Abstract). Fukuda teaches that large Si compounds and Fe compounds with a (electrical) potential higher than the matrix cause preferential corrosion (col. 2, lines 28-34). A sacrificial anode material is clad onto an aluminum strip and possesses a prescribed number of such "large" Si and Fe intermetallic particles where the line for "large" particles is drawn at 1 micron^2 of circle equivalent diameter. (col. 2, lines 54-64) These large particles are present to preferential corrode and thus protect the inner aluminum layer through galvanic protection.

Lastly, Fukuda teaches that Si and Fe compounds are dispersed in the sacrificial anode material matrix by adjusting the casting conditions of the aluminum alloy, in particular the casting temperature and the cooling rate (col. 5, lines 33-39).

Regarding claim 1, it would have been obvious to one of ordinary skill in the aluminum arts, at the time the invention was made, taking the disclosures of US '497 and Fukuda as a whole, to combine US ‘497 with Fukuda and continuous cast Al strip such that the intermetallic particles have an average size below above 1 micrometer^2. This is because both US ‘497 and Fukuda recognized the relationship between the casting rate and formation of intermetallic particles when continuously casting Al strip stock for heat exchanger components. While US '497 taught that large particles should

be avoid due to later problems with rolling thin foil, Fukuda then suggest that Fe and Si intermetallic particles with a size of greater than about 1 micrometer^2 preferentially corrode in a sacrificial anode layer. If one then is not using such a sacrificial anode layer then these large particles would plainly create pitting corrosion as suggested by Fukuda and one would be motivated to avoid the formation of such particles by controlling the casting process (particularly cooling rate as taught by both references) as Pitting corrosion is to be assiduously avoided in the core layer, which is what is being manufactured in the case of US '497.

Regarding claim 2, US ‘497 teaches that the sheets are further annealing during cold rolling (col. 3, lines 30-32, col. 5, lines 5 and 27-30).

Regarding claim 6, US ‘497 teaches that the Al strip is cold rolled to a final gauge of 60 micron (0.06 mm) (Figure 1 and Abstract).

Regarding claim 21, US ‘497 taught that the cooling rate during strip casting should be greater than 10 °C/sec but preferably less than 250 °C/sec which gives a range of cooling rates that overlaps the claims 10^2 - 10^3 (100-1000) °C/sec. It would have been obvious to one of ordinary skill in the art at the time of the invention to choose the instantly claimed ranges through process optimization, since it has been held that there the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch, 205 USPQ 215 (CCPA 1980). MPEP 2144.05, para I states: “In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists.”

(9-B) **<u>Claims 3 and 12</u>** are rejected under 35 U.S.C. 103(a) as being unpatentable over **US '497** in view of **Fukuda** as applied to claims 1-2, 6, and 21 above, in further view of **US ‘006** (US 6,531,006 B2).

The disclosures of US ‘497 and Fukuda were discussed above, however neither reference taught the intermediate annealing gauge as 0.58 mm.

<u>US ‘006</u>

US ‘006, in a very similar Al strip production process, teaches that after continuous casting, the Al strip is cold rolling to an interanneal gauge of 0.5-3.0 mm (col. 2, lines 55-63).

<u>Regarding claim 3,</u> it would have been obvious to one of ordinary skill in the aluminum arts, at the time the invention was made, taking the disclosures of US ‘497m Fukuda, and US ‘006 as a whole, to incorporate the inter-annealing gauge of US '006 into the Al strip production process as taught by US ‘497 in view of Fukuda as US ‘006 is drawn to the same problem as US ‘497 in how to produce thin foil Al strip stock for heat exchangers.

<u>Regarding claim 12,</u> US ‘497 taught that the alloy is cast to a strip between 3 and 20 mm thick, and then cold rolled to an interanneal gauge while US '006 adds that such an interanneal gauge should be 0.5 - 3 mm (col. 2, lines 54-63). MPEP 2144.05, para I states: “In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists.”

(9-C) **<u>Claims 4 and 5</u>** are rejected under 35 U.S.C. 103(a) as being unpatentable over **US '497** in view of **Fukuda** as applied to claims 1-2, 6, and 21 above,

in further view of **Ziegler** (US 3,827,917 A1) and **ASM Handbook** (Heat Treating of Aluminum Alloys -- Annealing, in ASM Handbook (revised Vol. 4) Metals Handbook, (1998).).

The disclosures of US ‘497 and Fukuda were discussed above, however neither reference teaches heating or cooling rates in relation to the annealing step.

<u>Ziegler</u>

Ziegler is drawn to the production of aluminum strips with controlled Fe intermetallic particle sizes and distribution (Abstract, col. 1, lines 15-20). As with US '497 and Fukuda, the intermetallic particle sizes are controlled by the initial casting method (col. 1, lines 15-43).

Ziegler teaches an annealing step where the Al strip is heated to 260 – 482 °C (col. 2, lines 55-72) and cooling to room temperature as a rate of 37.8 – 204.4 °C (col. 3, lines 1-8).

<u>ASM Handbook</u>

ASM Handbook, in the section on “Heat Treating of Aluminum Alloys – Annealing”, teaches that the heating rate can be critical for aluminum alloys (p. 4, para 1).

<u>Regarding claims 4 and 5,</u> it would have been obvious to one of ordinary skill in the aluminum arts, at the time the invention was made, taking the disclosures of US '497, Fukuda, Ziegler, and ASM Handbook as a whole, to incorporate the cooling rate of Ziegler into the Al production process of US '497 in view of Fukuda and to optimize the heating rate as taught by ASM Handbook.

Ziegler teaches a cooling rate that overlaps the claimed cooling rate and ASM Handbook teaches that the heating rate during annealing as important in grain growth. Put another way, Ziegler and ASM Handbook teach that the heating and cooling rates are art recognized result effective variables. It would have been obvious to one of ordinary skill in the art at the time of the invention to choose the instantly claimed heating and cooling rates through process optimization, since it has been held that there the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch, 205 USPQ 215 (CCPA 1980).

One would be motivated to combine Ziegler as it relates to the production of Al stock material with controlled sizes and distribution of Fe intermetallic particles. Similarly, one would be motivated to combine ASM Handbook as it teaches general processing conditions that should be considered and optimized in the annealing of Al stock.

With respect to the annealing temperature of 340°C and the soak time of 3 hours, one of ordinary skill would be motivated in the course of routine optimization to work within the temperature and time ranges disclosed by US '497.

(9-D) **Claims 13-16 and 18-20** are rejected under 35 U.S.C. 103(a) as being unpatentable over **US '497** in view of **Fukuda** as applied to claims 1-2, 6, and 21 above, in further view of **US '006 , Ziegler,** and **ASM Handbook**.

The disclosures of US '497 and Fukuda were discussed above however neither reference teaches the heating or cooling rates. Similarly the disclosure of US '006,

used to teach the interanneal gauge, was discussed in section 7 above while the disclosures of Ziegler and ASM Handbook, used to teach the cooling and heat rates respectively, were discussed in section 8 above.

Regarding claims 13-16, it would have been obvious to one of ordinary skill in the aluminum arts, at the time the invention was made, taking the disclosures of US '497, Fukuda, US '006, Ziegler, and ASM Handbook as a whole, to incorporate the interanneal gauge of US '006, the cooling rate of Ziegler, and the teaching regarding the heating rate from ASM Handbook into the Al strip production process of US '497 in view of Fukuda. This is because US ‘006 is drawn to the same problem as US ‘497 in how to produce thin foil Al strip stock for heat exchangers, Ziegler is similarly drawn to the production of Al product with controlled size of Fe intermetallic particles, and ASM Handbook teaches general processing conditions that should be considered and optimized in the annealing of Al stock.

With respect to the annealing temperature of 340°C and the soak time of 3 hours, one of ordinary skill would be motivated in the course of routine optimization to work within the temperature and time ranges disclosed by US '497.

Regarding claims 18-20, US ‘497 teaches that the Al strip is cold rolled to a final gauge of 60 micron (0.06 mm) (Figure 1 and Abstract).

With respect to the amendments to claims 18-20, these changes do not affect the scope of the claims as it relates to the instant rejections applied.

(10) Response to Argument

Appellants assert (p. 3, para 3) that US ‘497 does not disclose or suggest the importance of “a predetermined solidification rate ensuring material microstructure exhibiting primary particles having an average size below 1 micrometer^2” and further assert (p. 3, para 4) that US '497 is concerned with a totally different problem/solution and does not relate the size of Fe-bearing particles to pitting corrosion.

In response, characterizing US '497 as being concerned with a “totally different problem/solution" does not rebut a prima facie case of obviousness as Appellants have not argued that the reference is so different or disparate as to teach away (MPEP 2144.05, III, para 2 and *In Re Geisler*) from the claimed method nor have Appellants asserted that US ‘497 is so different as to be nonanalogous (MPEP 2141.01(a). The question is not whether the problem and solution of the Examiner’s cited references corresponds with that of the invention, but whether the prior motivated one to practice the claimed method.

Furthermore, Appellants characterization of US ‘497 belies a narrow view of what is actually claimed by the broadest claim, instant claim 1; a method of producing Al-alloy sheet with primary particles of average size of below 1 micrometer^2 by continuous strip casting, followed by cold rolling, and optionally intermediate annealing during the cold rolling. None of claims 1, 2, 6, and 20 mention pitting corrosion or even Fe precipitates.

Taking the claim as a whole, US '497 teaches casting with a predetermined solidification rate (col. 4, lines 20-26), forming intermetallic particles during casting and based on the cooling rate during casting (col. 4, lines 50-64) and subsequently cold rolling and optionally annealing (col. 5, lines 1-13 and 22-34).

However, the Examiner’s secondary reference of Fukuda recognized that larger particles cause preferential corrosion (col. 2, lines 54-64).

Appellant assert (p. 4, para 1-2) that Fukuda represents a totally different solution to corrosion compared with the present invention and that Fukuda’s use of cladding instead of altering microstructure proves non-obviousness.

In response, the Examiner disagrees in that Fukuda’s teaching with respect to larger particles (greater than 1 micrometer^2) as sacrificial corrosion centers is highly related to the instantly claimed method of claim 1 and US '497. This is because the alloy of US '497 does not require cladding for corrosion protection, instead increasing Zn and Fe contents to protect against corrosion (col. 2, lines 44-67), all while avoiding large intermetallic particles that would inhibit rolling to a thin gauge (col. 3, lines 20-26). Fukuda thus provides a further reason to avoid large particles in what is the core (unclad) material of a heat exchange (all of US '497, Fukuda, and the instant invention produce material for heat exchangers) - pitting corrosion in the form of preferential corrosion of intermetallic particles of greater than about 1 micrometer^2 size and thus teaches that corrosion caused by the presence of large particles may be mitigated by not forming "large" particles of greater than 1 micrometer^2. One would look to Fukuda because of the absence of a clear numerical definition of what constitutes “large” particles in US ‘497.

Thus in controlling the cooling rate from strip casting to form particles of less than 1 micrometer^2, one of ordinary skill following US ‘497 in view of Fukuda would avoid

large particles that both inhibit rolling to fine gauge and that would focus corrosion and cause pitting corrosion (per Fukuda's teachings).

In other words, what protects the underlying core layer of Fukuda (the pitting corrosion by larger particles in the cladding layer) is precisely what one of ordinary skill in aluminum alloy heat exchanger materials would have avoided forming in the core material (where one does not want corrosion) of US ‘497.

Appellants assert (p. 4, para 3) that neither reference suggests the possibility of controlling particle size to prevent corrosion as in the present invention.

In response, the Examiner disagrees in that US '497 is drawn to the minimization of particle size by control of casting conditions and specifically links the average cooling rate with the size of intermetallic particles produced (col. 4, lines 50-65) and Fukuda specifically teaches that such intermetallic compounds are dispersed by adjusting the casting conditions (col. 5, lines 34-40).

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner’s answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Mark L. Shevin/

Conferees:

/Roy King/

Supervisory Patent Examiner, Art Unit 1793

/Stanley Silverman/

Supervisory Patent Examiner, Art Unit 1793

October 15th, 2009
AU 1793

10-549,673